ETHYL CHLORIDE

Ethyl chloride is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 75-00-3 CH_3CH_2Cl

Molecular Formula: C_2H_5Cl

Ethyl chloride is a flammable gas at ordinary temperature and pressure. It burns with a smoky, greenish flame, which results in the production of hydrogen chloride. It has a characteristic ether-like odor and a burning taste. At low temperatures or under increased pressure, ethyl chloride is a mobile, very volatile liquid. It is soluble in water and miscible in alcohol and ether (Merck, 1983).

Physical Properties of Ethyl Chloride

Synonyms:	chloroethane; monochloroethane; chloroethyl; aethylis chloridum; ether chloratus; ether hydrochloric; ether muriatic; Kelene; Chelen; Anodynon; Chloryl Anesthetic; Narcotile
Molecular Weight:	64.52
Boiling Point:	12.3 °C
Melting Point:	-138.7 °C
Flash Point:	-50 °C (closed cup) -43 °C (open cup)
Vapor Density:	2.22 (air = 1)
Density/Specific Gravity:	0.9214 at 0/4 °C (water = 1)
Vapor Pressure:	1000 mm Hg at 20 °C
Log Octanol/Water Partition Coefficient:	1.43
Water Solubility:	5710 mg/L at 20 °C
Conversion Factor:	1 ppm = 2.64 mg/m^3

(Howard, 1990; HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Ethyl chloride is used as a chemical intermediate, in solvents, aerosols, and anesthesia. It has been detected in stack emissions from refuse combustion. Ethyl chloride has also been shown to be formed through microbial degradation of other chlorinated solvents in soil systems (HSDB, 1991).

The primary stationary sources that have reported emissions of ethyl chloride in California are manufacturers of plastics materials and synthetics, and manufacture of industrial inorganic chemicals (ARB, 1997b).

B. Emissions

The total emissions of ethyl chloride from stationary sources in California are estimated to be at least 291,000 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of ethyl chloride was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of ethyl chloride. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data from several urban and suburban locations throughout the United States. The mean concentration from 1980-86 was estimated to be at 55.7 micrograms per cubic meter ($\mu g/m^3$) or 21.1 parts per billion (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about indoor sources and concentrations of ethyl chloride was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

The only important chemical loss process for ethyl chloride in the troposphere is reaction with the hydroxyl (OH) radical. Based on its reaction with the OH radical, ethyl chloride has a calculated half-life and lifetime of 25 days and 35 days, respectively (Atkinson, 1995). Atmospheric removal by washout may also be possible; however, any ethyl chloride which

is removed will probably revolatilize into the air (Howard, 1990).

AB 2588 RISK ASSESSMENT INFORMATION

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics "Hot Spots" Program (AB 2588). Of the risk assessments reviewed as of December 1996, ethyl chloride was not listed in any of the risk assessments (OEHHA, 1996a,b).

HEALTH EFFECTS

Probable routes of human exposure to ethyl chloride are inhalation, ingestion and dermal contact (HSDB, 1991).

Non-Cancer: Ethyl chloride is mildly irritating to the eyes and lungs. It is a central nervous system depressant. Inhalation exposure to high levels of ethyl chloride may also sensitize the heart to the arrhythmogenic effects of epinephrine causing cardiac arrest. Animals exposed chronically to ethyl chloride via inhalation have shown changes to the lungs, liver, and kidneys (Sittig, 1991; U.S. EPA, 1994a). Those individuals who are exposed to known hepatotoxins or have a liver disease may be at increased risk (HSDB, 1991).

A chronic non-cancer Reference Exposure Level (REL) of 1.0×10^4 $\mu g/m^3$ is listed for ethyl chloride in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program, Revised 1992 Risk Assessment Guidelines. The toxicological endpoint considered for chronic toxicity is the reproductive system (CAPCOA, 1993). The U.S. EPA has established a Reference Concentration (RfC) of 1.0×10^4 $\mu g/m^3$ for ethyl chloride based on delayed fetal ossification in mice. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) for ethyl chloride (U.S. EPA, 1994a).

No information is available regarding adverse reproductive or developmental effects in humans from exposure to ethyl chloride. Several animal studies showed no adverse reproductive effects caused by ethyl chloride exposure (U.S. EPA, 1994a).

Cancer: Results from a two year National Toxicology Program inhalation bioassay study showed that female mice experienced a significant increase in the incidence of uterine tumors. The U.S. EPA has not classified ethyl chloride (chloroethane) with respect to carcinogenicity (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified ethyl chloride (chloroethane) in Group 3: Not classifiable (IARC, 1991a). The State of California has determined under Proposition 65 that ethyl chloride (chloroethane) is a carcinogen (CCR, 1996).